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(54) Valve ball element and method of manufacturing a valve ball element

(57) A method of manufacturing a valve ball element (40) includes the steps of selecting a first mold (1) to form a first body (10); locating the first body (10) into a second mold (2) then formed a second body (20), the second body (20) has a constant thickness of wax (21) wrapped around the first body at outside thereon; preparing a third mold (3) which is made of a molding method of dipping a shelling material, pouring high temperature molten metal into the third mold (3), the molten metal wrapped around the first body (10) with a ball shell (31), after cooling down then formed a third body (30); healing the opening (32) of the ball shell (31), machining the outer surface of the third body (30), cutting a slot (33), healing the opening (32) corresponding the position post (14) of the central point (141), polishing the outer surface of the third body (31) to let the third body (30) formed a pure smoothly complete product of a valve ball element (40) which is cheap, light, durable and no chemical changes.

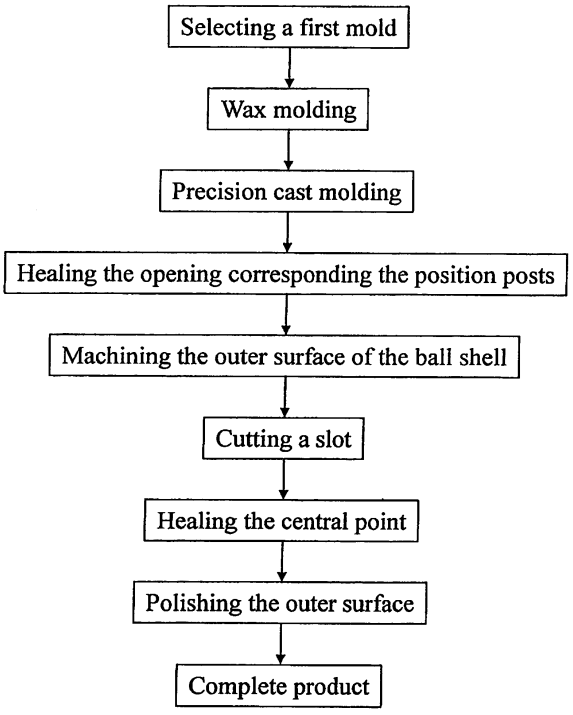

FIG. 1

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates generally to a ball valve, and more specifically, to a valve ball element and method of manufacturing a valve ball element.

2. Description of the Related Art

[0002] The prior ball valve normally has a ball element wholly made by metal material for standing high pressure during a long time, and to prevent friction of the water flow, but the high density of metal result the ball element weighty.

[0003] The ball element made by metal material provided pressure resistance and friction resistance, but non-metal ball element often has the problem of dirty, chemical changes and durable; on the other hand, the metal ball element is weighty and inconvenient to assemble, and the cost of the raw material get higher day by day, it must be reduced the usage of the metal for cost down.

SUMMARY OF THE INVENTION

[0004] The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a valve ball element and method of manufacturing a valve ball element, which can be produced by a new method to reduce the usage of metal but convenient to manufacture, and the valve ball element still maintain the advantages of cheap, light, durable and no chemical changes.

[0005] To achieve these and other objects of the present invention, the method of manufacturing a valve ball element comprises the steps of: selecting a first mold to form a first body; locating the first body into a second mold then formed a second body, the second body has a constant thickness of wax wrapped around the first body at outside thereon; preparing a third mold which is made of a molding method of dipping a shelling material, pouring high temperature molten metal into the third mold, the molten metal wrapped around the first body with a ball shell, after cooling down then formed a third body; healing the opening of the ball shell, machining the outer surface of the third body, cutting a slot, healing the opening corresponding the position post of the central point, polishing the outer surface of the third body to let the third body formed a pure smoothly complete product of a valve ball element which is cheap, light, durable and no chemical changes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a flow chart of a manufacturing method of a ball valve element of a preferable embodiment of the present invention.

FIG. 2 is a schematic view of a fist mold of the preferable embodiment of the present invention.

FIG. 3 is a schematic view of a fist body of the preferable embodiment of the present invention.

FIG. 4 is a schematic view of wax removing status of the preferable embodiment of the present invention.

FIG 5 is a schematic view of a second body of the preferable embodiment of the present invention.

FIG. 6 is a schematic view of a third mold of the preferable embodiment of the present invention.

FIG 7 is a schematic view of a third body of the preferable embodiment of the present invention.

FIG 8 is a schematic view of cutting a slot of the preferable embodiment of the present invention.

FIG 9 is another schematic view of cutting a slot of the preferable embodiment of the present invention.

FIG. 10 is a schematic view of a complete product of the preferable embodiment of the present invention.

FIG 11 is a schematic view of a complete product of the preferable embodiment of the present invention, showing the operation of the ball valve.

DETAILED DESCRIPTION OF THE INVENTION

[0007] Please refer FIG 1 to FIG 10, a valve ball element and method of manufacturing a valve ball element of a preferable embodiment of the present invention is provided, the method of manufacturing a valve ball element comprises the steps of follows.

[0008] As shown in FIG. 2, selecting a first mold **1** of suitable size relative to a preferred ball element size, let the fire-resistant material of Magnesium Oxide or Aluminum Oxide casting into the first mold **1,** then formed a first body **10** showing as the FIG 3; the first body **10** has an inner filler **11** of arch shape or hollow ball shape, a through hole **12** opened throughout the inner filler **11,** an opening **13** formed between the two ends of the inner filler **11,** a plurality of position posts **14** protruded at outside of the inner filler **11,** wherein at least one of the position posts **14** is located align to a mirror central line of the inner filler **11,** a central point **141** then defined by the at least one position post **14.**

[0009] As shown in FIG 4, locating the first body **10** into a second mold **2** which is made of metal material and can be processed by lathing or CNC milling via precision control, let the position posts **14** of the first body **10** located on the second mold **2,** there maintain a predetermined distance and space between the inner filler **11** of the first body **10** and the inner wall of the second mold **2,** pouring wax liquid into the second mold 2,then formed a second body **20** as shown in FIG.5, the second body **20** has a constant thickness of wax **21** wrapped around the first body 10 at outside thereon.

[0010] Preparing a third mold **3** which is provided for high temperature molten metal cast molding, the third mold **3** is made of a composite material having high temperature resistance and difficult to processed by lathing or CNC milling via precision control, the third mold **3** is made of a molding method of dipping a shelling material, let the second body **20** dipping into and putting out from the shelling material for several times, and let the shelling material dried and formed a consolidate and collapsible shell and then formed a third mold **3,** the third mold **3** is wholly wrapped around the second body **20,** further using the high temperature steam to melt and remove the wax; FIG 6 shows the layer of wax **21** of the second body **20** is removed, there maintain a predetermined distance and space between the inner filler **11** of the first body **10** and the inner wall of the third mold **3,** pouring high temperature molten metal into the third mold **3,** because the inner filler **11** of the first body **10** is made of fire-resistant material and will not melt or deformed by the high temperature of the molten metal, the molten metal wholly closely wrapped around the inner filler **11** of the first body **10** with a ball shell **31,** after cooling down then formed a third body **30.**

[0011] As shown in FIG 7, using knock method and the likes to remove the position posts **14** of the first body **10,** and healing the opening **32** of the ball shell **31** corresponding the position posts **14** except the central point **141** one; if the size of the valve ball element is bigger, the width of the opening **32** would not easy to welding, then it can be filled a metal block first, and then weld the gap between therein to healing the opening **32** of the ball shell **31,** it also achieve the function.

[0012] Machining the outer surface of the third body **30** to enhance the sphericity of the third body **30,** and removing the protrusions or embosses which leaved from the aforesaid steps.

[0013] As shown in FIG. 8, let the opening **32** of the ball shell **31** corresponding the central point **141** as a reference point, cutting a slot **33** at the opposite side of the ball shell **31,** the slot **33** will not cut to the inner filler **11** and formed between the opening **13** of the first body **10,** the slot **33** defined a direction perpendicular to a central axis line of the through hole **12,** the slot **33** is provided for turning control the ball valve.

[0014] Using the same step as the fourth step to welding and healing the opening **32** corresponding the position post **14** of the central point **141,** still also it can be filled a metal block first, and then weld the gap between therein to healing the opening **32** of the ball shell **31.**

[0015] Polishing the outer surface of the third body **30,** let the third body **30** formed a pure smoothly complete product of a valve ball element **40,** as shown in FIG 10.

[0016] Please refer FIG. 9 and FIG 10, the valve ball element **40** made by aforesaid steps, wherein the inner filler **11** is non-metal material, so it is low cost and low density, and helping cost down to enhance the competitive to others, and attract the purchasers to buy and use, it is light and easy to produce and assembly; and the outer surface is same as the common valve ball element, which has the outer metal surface, higher the friction resistance and the pressure resistance, maintaining the advantages of the metal valve ball, but adding the advantages of cheap and light of the plastic valve ball element.

[0017] The ball element of the present invention, as shown in FIG 11, which is provided for installing to a ball valve that connected with a pipe **50,** and can be operated by a control bar **51** coupled to the slot **33** to achieve the function of controlling of open or close of the flow.

[0018] The description above is a few preferred embodiments of the present invention and the equivalence of the present invention is still in the scope of the claim of the present invention.

[0019] The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

Claims

1. A method of manufacturing a valve ball element (40), **characterized in that** the method comprises the steps of:

   selecting a first mold (1) to formed a first body (10), the first body (10) has an inner filler (11) of a predetermined shape, a through hole (12) opened throughout the inner filler (11), a plurality of position posts (14) protruded at outside of the inner filler (11), wherein at least one of the position posts (14) is located align to a mirror central line of the inner filler (11), a central point (141) then defined by the at least one position post;

   preparing a third mold (3) to cover the first body (10), there maintaining a predetermined distance and space between the inner filler (11) of the first body (10) and the inner wall of the third mold (3), pouring high temperature molten metal into the third mold (3), the molten metal wrapped around the inner filler (11) of the first body (10) with a ball shell (31), after cooling down then formed a third body (30);

   using knock method and the likes to remove the position posts (14) of the first body (10), and healing the opening (32) of the ball shell (31) corresponding the position posts (14) except the central point (141) one;

   machining the outer surface of the third body (30) to enhance the sphericity of the third body (30), and removing the protrusions or embosses which leaved from the aforesaid steps;

let the opening (32) of the ball shell (31) corresponding the central point (141) as a reference point, cutting a slot (33) at the opposite side of the ball shell (31);
healing the opening (32) corresponding the position post (14) of the central point (141);
polishing the outer surface of the third body (30) to let the third body (30) formed a pure smoothly complete product of a valve ball element (40).

2. The method as claimed in claim 1, further comprising the step of using a second mold (2) to form a second body (20) before the third mold (3) covered the first body (10), wherein the second body (20) has a constant thickness of wax (21) wrapped around the first body (10) at outside thereon.

3. The method as claimed in claim 2, wherein the third mold (3) is made of a molding method of dipping a shelling material, the third mold (3) is wholly wrapped around the second body (20).

4. The method as claimed in claim 3, wherein let the second body (20) dipping into and putting out from the shelling material for several times, and let the shelling material dried and formed a consolidate and collapsible shell and then formed a third mold (3).

5. The method as claimed in claim 2, further comprising a step to remove the wax (21) of the second body (20) after the third mold (3) is formed but before purring high temperature molten metal.

6. The method as claimed in claim 5, wherein using the high temperature steam to melt and remove the wax (21).

7. The method as claimed in claim 2, further comprising the step of locating the first body (10) into the second mold (2), wherein let the position posts (14) of the first body (10) located on the second mold (2).

8. The method as claimed in claim 1, wherein the first body (10) is made of fire-resistant material of Magnesium Oxide or Aluminum Oxide.

9. The method as claimed in claim 1, wherein the healing step of the position posts (14) is to healing the opening (32) of the ball shell (31) by welding.

10. The method as claimed in claim 1, further comprising a step to fill a metal block into the opening (32) first, and then welding the gap between therein to healing the opening (32) of the ball shell (31).

11. A valve ball element (40), **characterized in that** the valve ball element (40) comprises an inner filler (11) and a metal ball shell (31) wholly closely wrapped around the inner filler (11), the inner filler (11) being made of fire-resistant material, wherein the inner filler (11) reduced the metal volume ratio of the valve ball element (40), thereby lightening the weight and lowering the metal cost.

12. The valve ball element (40) as claimed in claim 11, wherein the inner filler (11) is formed of arch shape or hollow ball shape.

13. The valve ball element (40) as claimed in claim 11, wherein the inner filler (11) is made of fire-resistant material.

14. The valve ball element (40) as claimed in claim 11, wherein the material of the inner filler (11) is Magnesium Oxide or Aluminum Oxide.

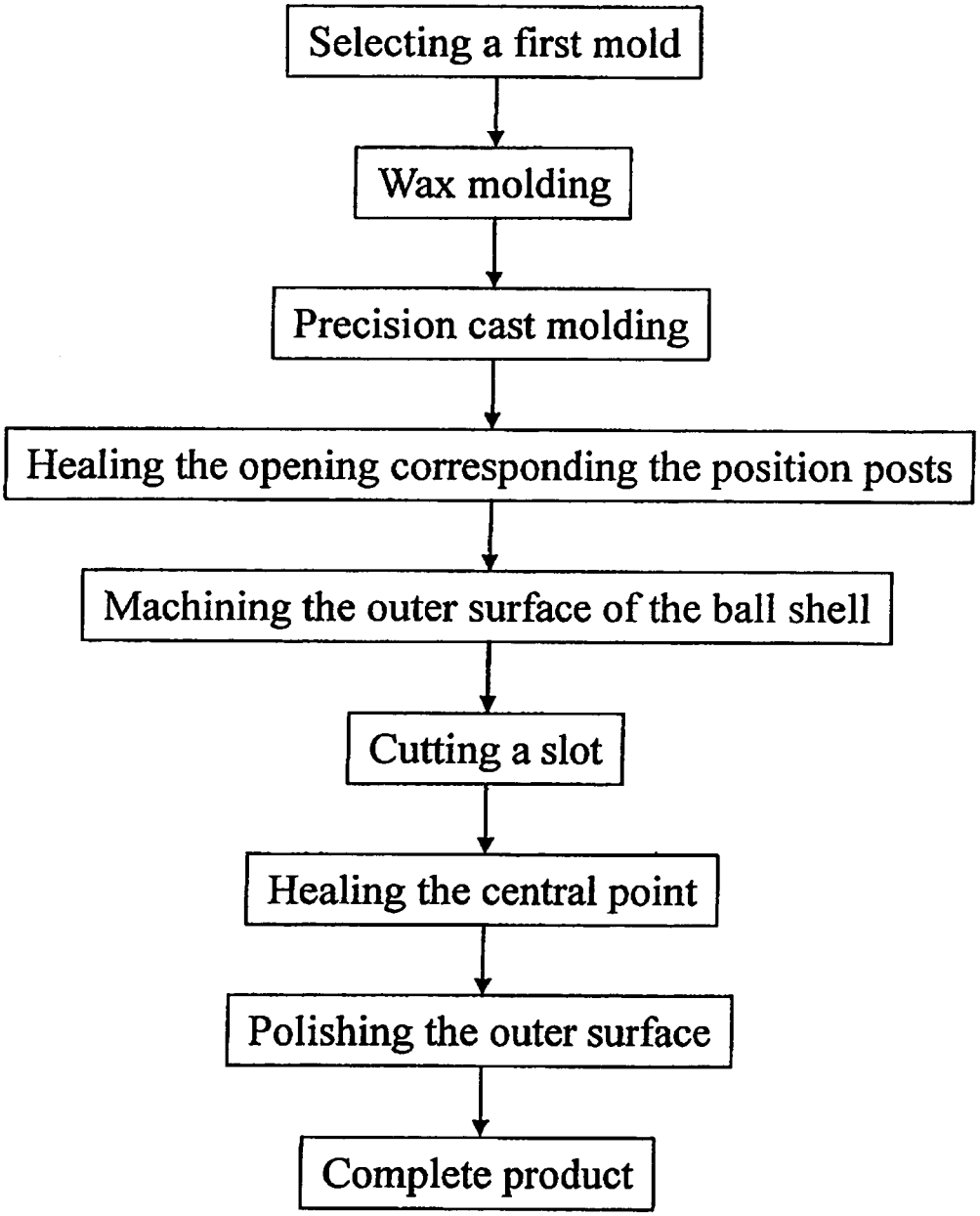
Selecting a first mold
Wax molding
Precision cast molding
Healing the opening corresponding the position posts
Machining the outer surface of the ball shell
Cutting a slot
Healing the central point
Polishing the outer surface
Complete product

FIG. 1

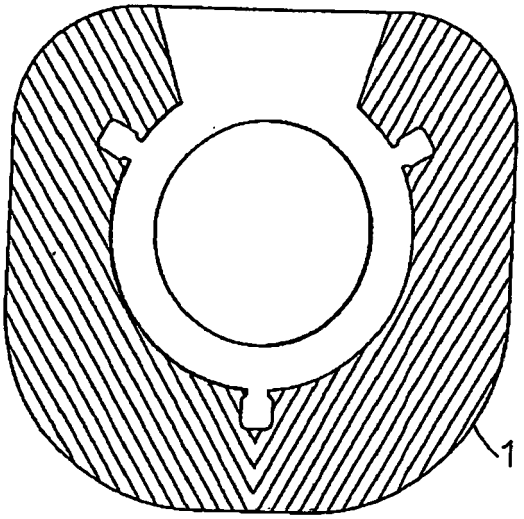

FIG. 2

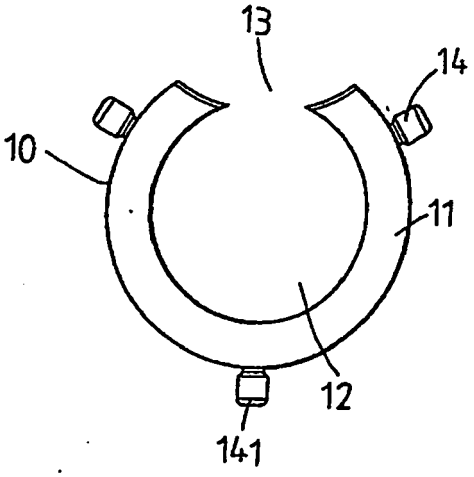

FIG. 3

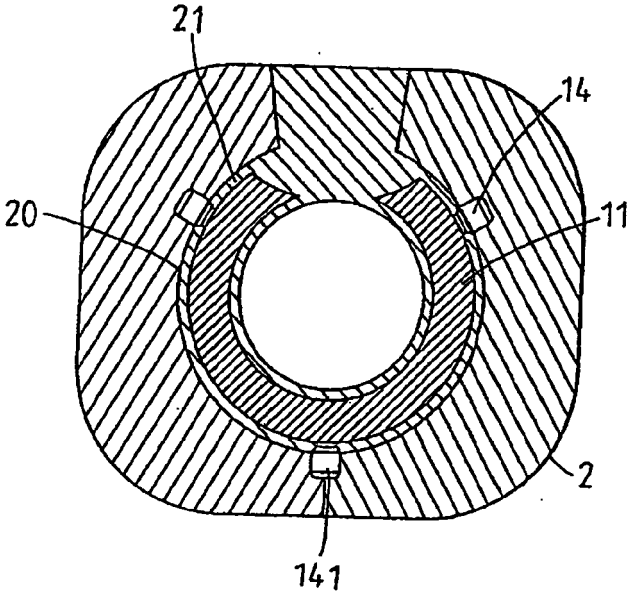

FIG. 4

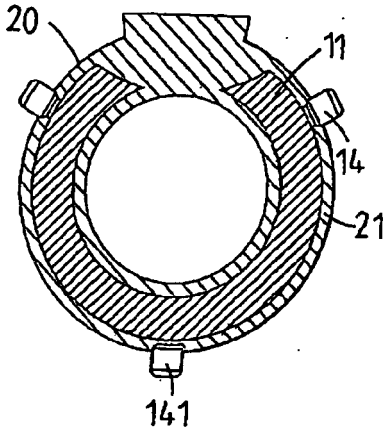

FIG. 5

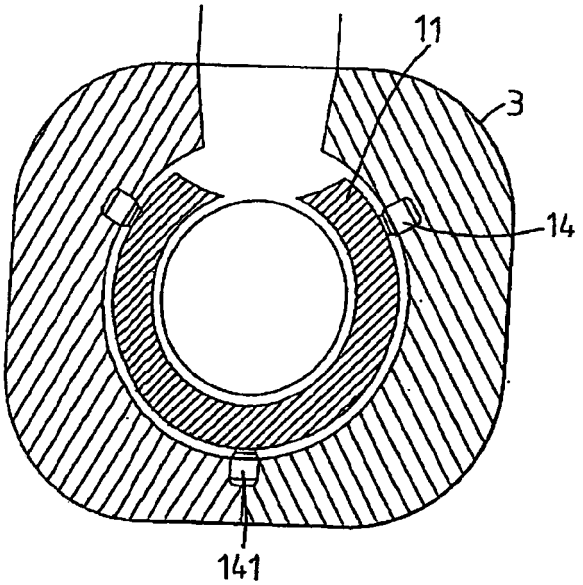

FIG. 6

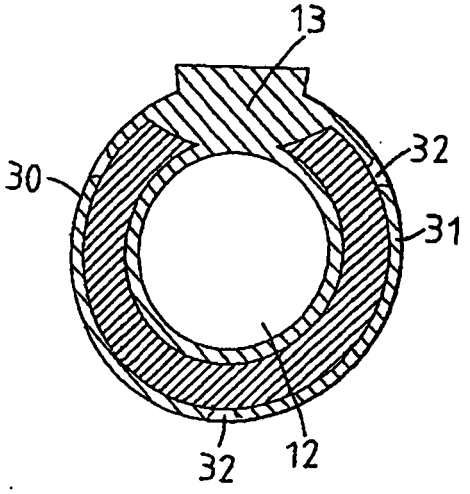

FIG. 7

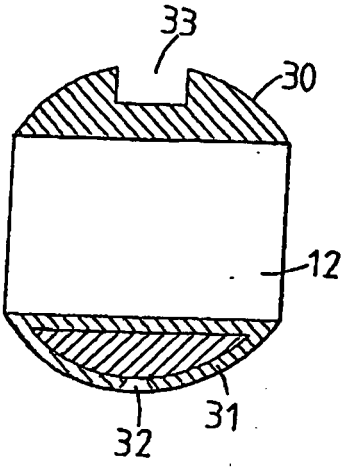

FIG. 8

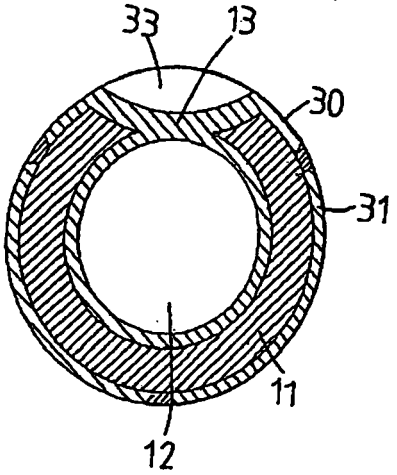

FIG. 9

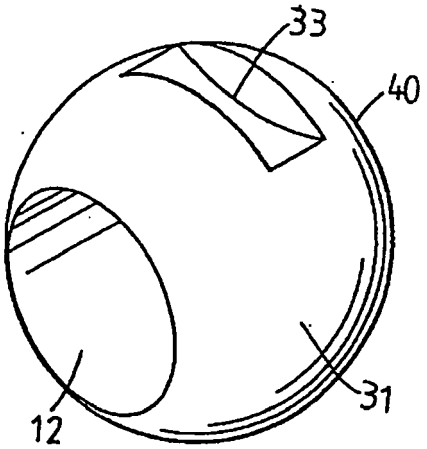

FIG. 10

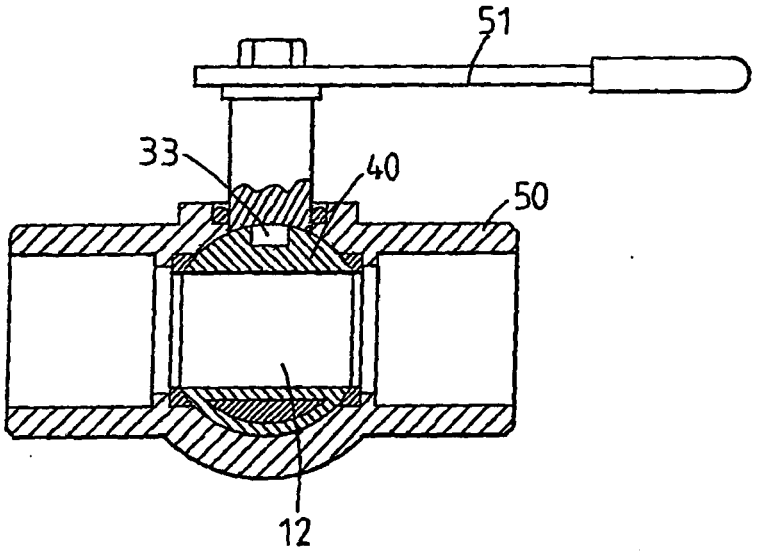

FIG. 11